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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,436	07/24/2003	Klavs F. Jensen	0492611-0477	9621
24280	7590	07/26/2006	EXAMINER	
CHOATE, HALL & STEWART LLP			LEUNG, JENNIFER A	
TWO INTERNATIONAL PLACE			ART UNIT	
BOSTON, MA 02110			PAPER NUMBER	

1764

DATE MAILED: 07/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/626,436

Applicant(s)

JENSEN ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-37 and 116-119 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-37 and 116-119 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment submitted on May 8, 2006 has been received and carefully considered. Claims 1 and 38-115 have been cancelled. Claims 116-119 are newly added. Claims 2-37 and 116-119 are under consideration.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 15-30, 34, 35, 37, 117 and 118 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 15, it is unclear as to what "means" (i.e., what structure and equivalents thereof) corresponds to the "means for employing solution-based sol-gel processing".

Regarding claims 16-18, 117 and 118, it is unclear as to the structural limitation applicant is attempting to recite because the first, second and third reactant streams are not considered elements of the apparatus, and their respective flow rates are considered process limitations.

Regarding claims 19-30, it is unclear as to the structural limitation applicant is attempting to recite because the colloidal nanoparticles are not considered elements of the apparatus.

Regarding claims 34, 35 and 37, it is unclear as to structural limitation applicant is attempting to recite because the "quench fluid" is not considered an element of the apparatus.

Please note that the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. As stated in MPEP 2115,

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“Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim.” *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, “[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims.” *In re Young*, 75 F.2d 996, 25 USPQ 69 (CCPA 1935) (*In re Otto*, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)).

In *In re Young*, a claim to a machine for making concrete beams included a limitation to the concrete reinforced members made by the machine as well as the structural elements of the machine itself. The court held that the inclusion of the article formed within the body of the claim did not, without more, make the claim patentable.

In *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967), an apparatus claim recited “[a] taping machine comprising a supporting structure, a brush attached to said supporting structure, said brush being formed with projecting bristles which terminate in free ends to collectively define a surface to which adhesive tape will detachably adhere, and means for providing relative motion between said brush and said supporting structure while said adhesive tape is adhered to said surface.” An obviousness rejection was made over a reference to Kienzle which taught a machine for perforating sheets. The court upheld the rejection stating that “the references in claim 1 to adhesive tape handling do not expressly or impliedly require any particular structure in addition to that of Kienzle.” The perforating device had the structure of the taping device as claimed, the difference was in the use of the device, and “the manner or method in which such machine is to be utilized is not germane to the issue of patentability of the machine itself.”

### ***Claim Rejections - 35 USC § 102 and § 103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

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international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 5-7, 9-14, 16-32 and 116-118 are rejected under 35 U.S.C. 102(b) as being anticipated by Nikiforov (US 6,107,044).

Regarding claims 116 and 7, Nikiforov discloses an apparatus (i.e., microfluidic device 200; FIG. 2) comprising: at least one inlet channel (i.e., injection channel 212); at least one micromixing block (i.e., intersection 214) downstream for the at least one inlet channel; an aging section comprising at least one aging channel (i.e., separation channel portion 210) downstream from the micromixing block; and at least one outlet channel (i.e., leading to waste reservoir 208) downstream from the aging section; wherein the at least one inlet channel 212, the micromixing

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block **214**, the aging section **210**, and the outlet channel **208** reside on one integrated substrate (i.e., a body structure **202**). The recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. (see comments above).

Regarding claims 5 and 6, the width and depth of the inlet channel **212** is within the instantly claimed ranges (see column 3, line 49 to column 4, line 9).

Regarding claims 9 and 10, the width and depth of the aging channel **210** is within the instantly claimed range (see column 3, line 49 to column 4, line 9).

Regarding claims 11-13, the apparatus comprises means for introducing a first reactant stream (via **224**), a second reactant stream (via **206**), and a third reactant stream (via **218**) into a first inlet channel, a second inlet channel, and a third inlet channel, respectively (see FIG. 2).

Regarding claim 14, more than one reactant stream is introduced via one inlet channel (e.g., reservoirs **216**, **218**, **220** and **222** connect to a single inlet channel; FIG. 2).

Regarding claims 16-18, 117 and 118, the apparatus of Nikiforov structurally meets the claims because the first, second and third reactant streams are not considered elements of the apparatus, and their respective flow rates are considered process limitations.

Regarding claims 19-30, the apparatus of Nikiforov structurally meets the claims because the synthesized colloidal nanoparticles are not considered elements of the apparatus.

Regarding claims 31 and 32, the micromixing block **214** has one or more channels having a width and depth within the instantly claimed ranges (see column 3, line 49 to column 4, line 9).

Instant claims 5-7, 9-14, 16-32 and 116-118 structurally read on the apparatus of Nikiforov.

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4. Claims 2, 5-13, 15, 18, 31-33 and 116-119 are rejected under 35 U.S.C. 102(e) as being anticipated by Swinehart et al. (US 2005/0129580).

Regarding claims 116 and 7, Swinehart et al. discloses a microreactor system (see section [0021], FIG. 1A) comprising:

at least one inlet channel (i.e., the channels, not labeled, located between reagent ports 104 or 106 and mixing point 110; FIG. 1A); at least one micromixing block (i.e., mixing point 110, FIG. 1A; structured according to the mixing structures shown in FIG. 3A, 3B, 3C or 3D) downstream from said inlet channel; an aging section comprising at least one aging channel (i.e., comprising growth flow path 116) downstream from said micromixing block 110; and at least one outlet channel (i.e., leading to outlet port 122; FIG. 1A, 1B) downstream from said aging section 116; wherein the inlet channel, micromixing block, aging section and outlet channel reside on one integrated substrate (see FIG. 1A, 1B, 1C; also, section [0115]).

Please note that the recitation of “at least one colloidal nanoparticle” adds no further patentable weight because the inclusion of a material or article worked upon by an apparatus does not further limit apparatus claims. (see comments above). In any event, Swinehart et al. specifically discloses that the material or article worked upon by the apparatus comprises at least one colloidal nanoparticle (i.e., nanocrystals, see sections [0009], [0031], [0032], [0033]), which is outputted by the outlet channel 122.

Regarding claim 2, Swinehart et al. disclose an ultrasonication means (e.g., ultrasonic agitation means, or ultrasonic pumps; sections [0075], [0081]).

Regarding claims 5 and 6, Swinehart et al. disclose channel widths and depths within the instantly claimed ranges (see section [0007], [0069]).

Regarding claims 8-10, Swinehart et al. disclose at least one aging channel (i.e., the growth flow path 116 within the growth section of the microfluidic module) having a length, width and depth within the instantly claimed ranges (see sections [0068], [0069]).

Regarding claims 11 and 12, Swinehart et al. disclose means (see sections [0078], [0081]) for introducing a first reactant and a second reagent into said microreactor at the first inlet channel and the second inlet channel, respectively (via reagent ports 104 and 106; FIG. 1A).

Regarding claim 13, Swinehart et al. discloses means (see sections [0078], [0081]) for introducing a third reactant stream into the microreactor at a third inlet channel (e.g., via additional port 120, 132 or 134; see sections [0021]).

Regarding claim 15, as best understood, the apparatus of Swinehart et al. comprises means for employing solution-based sol-gel processing, given that it comprises each of the recited structural elements. (sections [0033] and [0041] suggest sol-gel processing).

Regarding claim 18, the microreactor of Swinehart et al. structurally meets the claims because the flow rate of the first reactant is a process limitation that does not further limit the apparatus. In any event, Swinehart et al. discloses that the reactant streams are supplied to the microreactor at a flow rate within the instantly claimed range (e.g., at flow rates ranging from 1  $\mu$ L/min to 10 mL/min; see section [0078]).

Regarding claims 31 and 32, micromixing block 110 (FIG. 1A; also FIG. 3A-3D) has one or more channels with a width and depth within the instantly claimed ranges (see section [0069]).

Regarding claim 33, Swinehart et al. further discloses a quench fluid inlet port (e.g., the final port 120 with respect to the fluid flow direction; FIG. 1A; section [0021]) downstream from said aging section 116 and upstream from said at least one outlet channel 122.



Regarding claims 117 and 118, the microreactor of Swinehart et al. structurally meets the claims because the flow rates of the second reactant and the third reactant are process limitations that do not further limit the apparatus. In any event, Swinehart et al. discloses that the reactant streams may be supplied to the microreactor at a flow rate within the instantly claimed ranges (e.g., at flow rates ranging from 1  $\mu$ L/min to 10 mL/min; see section [0078]).

Regarding claim 119, Swinehart et al. further discloses means (see sections [0078], [0081]) for introducing a quench fluid into said quench fluid inlet port 120.

Instant claims 2, 5-13, 15, 18, 31-33 and 116-119 structurally read on the apparatus of Swinehart et al.

5. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swinehart et al. (US 2005/0129580) in view of Chandler et al. (US 6,506,584) and Yasuda et al. (US 6,244,738).

Swinehart et al. discloses an ultrasonication means (see sections [0075], [0081]), but is silent as to said means comprising the specifically claimed ultrasonication means.

Chandler et al. (column 5, lines 4-26; column 7, line 24 to column 8, line 18; FIGs. 2, 4) teaches a conventionally known ultrasonication means comprising an ultrasonication transducer or an ultrasonication bath. Yasuda et al. (FIG. 1, 2; column 1, line 5 to column 3, line 36) also teaches a conventionally known ultrasonication means comprising an ultrasonication transducer.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the ultrasonication means of Chandler et al. or Yasuda et al. for the ultrasonication means in the apparatus of Swinehart et al., on the basis of suitability for the intended use thereof and absent showing any unexpected results thereof, because the substitution

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of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

6. ... Claims 14, 16, 17, 19-30 and 34-37 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Swinehart et al. (US 2005/0129580).

Regarding claim 14, the microreactor of Swinehart et al. structurally meets the claims because the reactant stream is not considered an element of the apparatus, and the particular number of reactants to be introduced to the microreactor via a single inlet channel is a process limitation that does not further limit the apparatus. In any event, Swinehart et al. discloses that, “Reagent fluids can be added to the reactor through one or both of the ports 104 and 106,” (section [0021], with emphasis added), and therefore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to supply more than one reactant to the microreactor via a single inlet channel 104 or 106 in the apparatus of Swinehart et al., on the basis of suitability for the intended use thereof.

Regarding claims 16 and 17, the microreactor of Swinehart et al. structurally meets the claims because the first reactant stream and the second reactant stream are not considered elements of the apparatus. As commented above, limitations relating to a material or article worked upon by an apparatus do not further limit apparatus claims. In any event, Swinehart et al. discloses that the reactant streams may comprise a variety of fluids (such as the fluids suggested in section [0035]), which selection will depend on the desired nanoparticles to be synthesized (such as the nanocrystals suggested in section [0033]). Thus, it would have been an

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obvious design choice for one of ordinary skill in the art at the time the invention was made to select the claimed reactant streams for the first and second reactant streams in the apparatus of Swinehart et al., on the basis of suitability for the synthesis of an intended nanoparticle.

Regarding claims 19-30, the microreactor of Swinehart et al. structurally meets the claims because the nanoparticles are not considered an element of the apparatus. As commented above, limitations relating to a material or article worked upon by an apparatus do not further limit apparatus claims. In any event, Swinehart et al. discloses that a variety of nanoparticles may be synthesized using the claimed apparatus, including semiconductor nanocrystals of the Group IV elements and metal oxide nanocrystals, such as alumina and titania, which can be further doped with lanthanide series elements (see section [0033]). Thus, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select one of the claimed nanoparticles to be synthesized using the apparatus of Swinehart et al.

Regarding claims 34, 35 and 37, the microreactor of Swinehart et al. structurally meets the claims because the quench fluid is not considered an element of the apparatus. As commented above, limitations relating to a material or article worked upon by an apparatus do not further limit apparatus claims. In any event, Swinehart et al. further discloses that port 120 may be used for adding a variety of solvents (see sections [0021], [0035]). Thus, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select one of the claimed solvents for quenching the reaction in the apparatus of Swinehart et al., on the basis of suitability for the synthesis of an intended nanoparticle.

Regarding claim 36, Swinehart et al. further discloses a means (see sections [0078], [0081]) for introducing at least one reactant stream into said microreactor at said at least one inlet

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channel (e.g., via port 104 or 106), and wherein said quench fluid inlet port 120 is adapted to introduce a quench fluid (e.g., a solvent) into said microreactor. The apparatus of Swinehart et al. structurally meets the claims because the particular flow rate of the quench fluid relative to the flow rate of the at least one reactant stream is considered a process limitation that does not further limit the apparatus. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a flow rate for the quench fluid that was equal to or greater than the flow rate of the at least one reactant stream in the apparatus of Swinehart et al., on the basis of suitability for the intended use thereof, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Instant claims 14, 16, 17, 19-30 and 34-37 structurally read on, or in the alternative, are obvious over the apparatus of Swinehart et al.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 2-37 and 116-119 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

\* \* \*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung  
July 20, 2006 *JAL*

*Alexa Doroshenk Neckel*  
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PRIMARY EXAMINER